



INDUSTRIAL MANAGEMENT PROJECT

USAID Industrial Management Project

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Abbreviations and Acronyms

ATF	Access to Finance
CEED	Center for Entrepreneurship and Executive Development
CEIP	Clean Energy Investment Project
DPM	Deputy Prime Minister
EBRD	European Bank for Reconstruction and Development
EMS	Energy Management System
ESCO	Energy Service Company
FI	Financial Institution
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GoM	Government of Macedonia
IMP	Industrial Management Project
ISO	International Organization for Standardization
ktoe	kilo ton oil equivalent
LAN	Local Area Network
LEC	Local Engineering Company
OECD	Organization for Economic Cooperation and Development
REC	Regional Environmental Center
SME	Small and Medium sized Enterprises
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
USG	United States Government
VAT	Value Added Tax
WebSEFF	Western Balkan Sustainable Energy Financing Facility

1 EXECUTIVE SUMMARY

The excessive energy costs incurred due to inefficient energy use in Macedonian industry significantly affect the competitiveness of industrial products on domestic and regional markets. Ever-increasing utility costs reduce profits, erode capital and maintenance budgets, and increase product costs. Today Macedonian industry accounts for more than a third of the national primary energy consumption and greenhouse gas emissions, it participates with more than 28% of GDP, and employs over 30% of labor force. Therefore, the real immediate need and challenge is to introduce proven energy management practices to ensure sustainable energy efficiency and continuous performance improvement in industry.

The use of energy management practices in Macedonian industry is significantly important – on one hand, due to increasing energy costs – and on the other hand, due to efforts to sustain the competitive edge and concur new markets. With the rise in energy costs coupled with the ongoing economic and financial crises leading to reduced trade and business activity, companies need to look for ways of improving their competitiveness through internal cost reduction. The inclusion of well-structured energy management as a systematic approach to track energy use and optimize energy demand will also help industrial plants in continuous process improvement and increased competitiveness.

In 2015 IMP expanded the project working closely with contracted pilot companies, discussing and inviting new customers, training beneficiaries, and marketing the project through various channels and venues.

The project brought results met or exceeded results in number of areas including marketing the project, increasing awareness for energy management in industries, training and educating companies on ISO 50001 standard and best energy management practices, as well as training local engineering companies on EnMS development, installation and maintenance. Other targeted performance indicators such as GHG emission reduction and electricity savings at pilot companies were postponed for reporting due to the one-year monitoring period of installed EnMS in 2014 that will take place throughout 2015. However, although signed 5 contracts with new companies, IMP did not succeed to meet the targeted performance indicators, which is also contributed to several factors that impacted the project results. These factors include the Macedonian Government decision to postpone electricity market liberalization, illiquidity issues of companies caused by ongoing economic crisis and increased internal debt in the country, elections in 2014 and resulting political instability in the country, as well as existing factors such as low awareness of the benefits of energy efficiency in industrial companies, partly due to lack of metering and control devices.

With the 2015 liberalization of the national electricity market, an increasing number of small and medium sized companies in Macedonia were looking for ways to move toward higher levels of business focus and data tracking in order to realize costs savings and build a competitive advantage. However, the Macedonian Government decided to delay the full liberalization of the electricity market set for January 1, 2015 to implement it in five phases beginning of July 1, 2016 conclusive with July 1, 2020.

Macedonian companies, in particular SMEs, are challenged with liquidity issues when financing their operations. Amid shrinking exports caused largely by the European crisis, SMEs face tough time to

secure financing given large requirements in collateral from banks extending loans. A large portion of Macedonian companies, in particular small enterprises, have frozen bank accounts because of their financial liquidity problems.

Local banks became more conservative in extending loans despite unchanged demand for credit from the private sector. Domestic companies secure financing primarily from their own cash flow, due to lack of corporate bonds or securities as alternative credit instruments. Because of the scarcity of other private financing, credit demand is high, affecting interest rates. In addition, some companies reported that delaying of public sector payments to the private sector contribute greatly to the liquidity problem in the country.

Among few other issues, liquidity problems on the market and postponing the market liberalization had negative impact on the outcome and slowed down the decision-making process by top managements at companies that were strongly committed to implement EnMS.

Amid this financial issues that impact companies daily operations, IMP continued to offer cost-sharing support to manufacturing companies for introducing energy management systems and technical support for improving energy efficiency and thus reducing costs that improves bottom line.



Picture 1: EMS installation in pilot company Veze Sharri, Tetovo

In 2014 IMP fully installed and commissioned 10 pilot companies. Additional two other companies were contracted which implementation and commissioning will take place in 2015. To date, IMP developed EnMS specs, including blueprints and cost proposals for additional 21 candidate companies, which did not agree to continue with EnMS implementation after initially given strong commitment by their top managements. In addition, IMP discussed interest for EnMS implementation to at least other 40 industrial companies that met initial project eligibility criteria. As a continued energy efficiency improvement process, in 2014 IMP provided technical assistance and access to finance support to Alkaloid, the pharmaceutical company that asked for IMP support. IMP's expert team conducted a detailed energy audit with recommendations for the most suitable interventions at the laboratory building and prepared an eligibility assessment according to EBRD WebSEFF criteria as part of company's loan application, which was approved and successfully funded through NLB Tutunska Bank.

IMP trained technical staff of the two selected local engineering companies on EnMS development, installation and maintenance. The training included a theoretical education and practical on-site experience on EnMS implementation at two pilot companies, Veze Sharri and Nova Refraktori.

IMP continued close cooperation with the UNIDO team on delivering quality trainings to non-participant companies. Total of three trainings were held in March and November. Around 60 participants representing 39 organizations attended the trainings, most of them being engineers, middle or top managers from the local industrial companies. The representatives were trained on energy management principles and ISO 50001 standard including development of energy information and plans, presentation of energy metrics and energy performance indicators, discussion of management commitment, checking, management review and project planning, and presentation of energy management systems from selected EMS vendors. All trainings were well received by the trainees.

In October 2014, IMP team participated on the 37th World Energy Engineering Congress (WEEC) that was held in Washington, DC. Organized by the Association of Energy Engineers (AEE), the WEEC is well-recognized as the most important energy event of U.S. and international scope for end users and energy professionals in all areas of the energy field. IMP representatives presented the project and discussed progress at the USAID E&E Bureau in Washington, DC. The discussion was closely followed by representatives from the National Renewable Energy Laboratory and the Department of Energy.

In December 2014 IMP organized a round table discussion about how Macedonian companies can improve their competitiveness and foster a culture of continuous improvement through enhanced energy management practices. It was in close cooperation with the project's stakeholder Macedonian Energy Association (MEA) within the Economic Chamber of Macedonia. The objective was to present testimonials from pilot companies of using EnMS and to look into possibilities of scaling-up energy management best practices in Macedonia.

The IMP highlights by components are shown in the table below.

Table 1: IMP Highlights by Component

Component	Key Activities	Outcomes
Industry Selection	<ul style="list-style-type: none"> • Component fully completed in 2013 	<ul style="list-style-type: none"> • Developed a database of more than 400 manufacturing companies in Macedonia as a target group
Demonstration Projects	<ul style="list-style-type: none"> • Fully installed and commissioned 10 EnMS at contracted pilot companies • Ongoing installation at 2 pilot companies; EnMS will be completed in 2015 • Additional 15 companies received project designs, including blueprints and detailed cost specifications for EnMS installation • One pilot company received technical and access to finance support which resulted in EUR 200,000 bank approval for financing an energy efficiency upgrade project • Discussed directly to additional more than 40 manufacturing companies of various industries 	<ul style="list-style-type: none"> • To date contracted 12 pilot companies for EnMS installation with USG cost-sharing support • Started EMS procurement and installation services at 2 pilot companies • Developed project designs to additional 15 companies that can utilize them in future • Provided technical support and raised capital for one energy efficiency upgrade project for a pilot company • Raised awareness to other interested companies by sharing EnMS examples • Initiated system integration by show case to large companies by vendors on local market
Training and Sector Development	<ul style="list-style-type: none"> • Conducted theoretical and practical, on-site training to staff from two local engineering companies 	<ul style="list-style-type: none"> • Increased capacity for energy management development of local service providers
Outreach	<ul style="list-style-type: none"> • Continued close cooperation with UNIDO • Organized three joint workshops on ISO 50001 standard and energy management best practices • Organized a round table discussion at Chamber of Commerce • Participated on the 37th World Energy Engineering Congress in Washington DC • Published interviews and participated on media broadcasting to discuss IMP 	<ul style="list-style-type: none"> • Trained 60 participants representing 39 non-participant companies • Presented IMP accomplishments on a round table to 50 participants from various stakeholders including government officials, relevant ministries, Energy Agency, Energy Regulatory Commission, non-government organizations, international donor community, financial institutions, industrial associations and business community attended the event • Presented the project and discussed progress at the USAID E&E Bureau in Washington DC, including representatives from the National Renewable Energy Laboratory (NREL) and the Department of Energy (DoE) • Increased awareness for industrial energy management • Overall, to date shared IMP information, advantages and benefits to more than 230 companies • Raised awareness to public institutions including Energy Agency, Ministry of

		Economy and Ministry of Environment, industrial associations, and other donor projects
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2 BACKGROUND

The Macedonian energy sector is in a transitional phase from a centrally planned and managed structure to a decentralized, regulated free market. On the demand side the key challenge of the country's energy sector is to improve the efficiency of energy usage, which has been held back by below-market pricing for all but the largest users. On the supply side the challenges encountered include limited range of options for energy supply – due to country's lack of oil, gas, or high-quality coal reserves – and aging energy generation facilities. Recent reforms are helping to address these issues, and the country is committed to further reforms to bring about the full liberalization of the energy market.

Industrial manufacturing companies in Macedonia are quickly coming to the realization that energy and sustainability issues are a critical requirement for the competitiveness and even survival of their businesses. Using one third of all the energy consumed in Macedonia on an annual basis, with high price volatility and stiff regional and EU competition for market share, Macedonian industries need to better understand their energy consumption patterns and adopt organizational capabilities to better manage its use. It has become not only a company-specific issue, but a national imperative as well.

The use of energy management systems in Macedonian industry is important – on one hand, due to increasing energy costs – and on the other hand, due to efforts to sustain the competitive edge and concur new markets. Energy efficiency in production, in particular, helps companies increase productivity in their plants, which in turn improves their competitiveness in all sectors. Inclusion of well-structured energy management system as a systematic approach to track energy use and reduce costs will help industrial production plants in maintaining or increase their market share on domestic or regional markets.

With the aim to improve Macedonia's competitiveness and energy security and reduce greenhouse gas emissions via greater clean energy investments, the USAID initiated the three-year Industrial Management Project. The project commenced on January 13, 2013. The implementation of the IMP is managed by TimelProekt, as a Prime Contractor to the USAID, with PointPro Consulting and the Center for Entrepreneurship and Executive Development (CEED) as implementing Partners.

3 INTRODUCTION

The underlying IMP objective is to introduce Energy Management Systems in 17 industrial pilot companies and further assist 6 pilot companies by providing technical expertise and access to finance for implementing energy efficiency upgrade projects identified based on EMS measurements and tracking energy. The EMS is a combination of software, data acquisition hardware, and communication systems to collect, analyze and display energy-related information to aid industrial energy managers, facility managers, production and financial managers in reducing energy use and costs in industrial plants. This technology helps perform key energy management functions such as organizing energy use data, identifying energy consumption anomalies, managing energy costs, optimizing energy demand, and build strategies for efficient and timely respond to anomalies.

EMS provides the following capabilities: collect and archive facility energy data, and visualize data in a meaningful fashion. It also enables companies to facilitate energy benchmarking, optimize energy procurement, and manage overall energy costs.





Once EMS is installed, the first step is understanding how much power a piece of equipment or a plant is consuming. The electric bill is not going to provide the level of detail required. Advanced power meters are installed, as they provide accurate real-time system values, and capture waveforms and power quality events to add intelligence and save costs. Meters identify the harmonics, voltage fluctuations, transient over-voltage conditions and other conditions, while also capturing power and energy data from equipment.





Meters keep a continual log of electrical parameters including volts, amps, watts, kilowatt-hours and power factor. Typically, meters are installed at the largest loads or so called significant energy users. Critical loads are also typically metered.

Power quality meters are first installed at the service entrance to establish the overall baseline and data points. This provides information on both the quality of the power the utility is delivering and the amount of power consumed. If there is a discrepancy between the utility charges and what is consumed, actual consumption can be demonstrated to the utility along with power quality data.

Telecommunication network along with intelligent protocols (modbus, profibus) and network communication technologies (RS 485/ RS 232, Ethernet, Wireless) are then used to collect energy and power data. The data is stored on a web-client server where a software system is installed to collect real-time data and generate custom-made reports, alarms and custom graphical representations of the monitoring system.

The complete, web-enabled, energy management solution for industrial operations helps to:

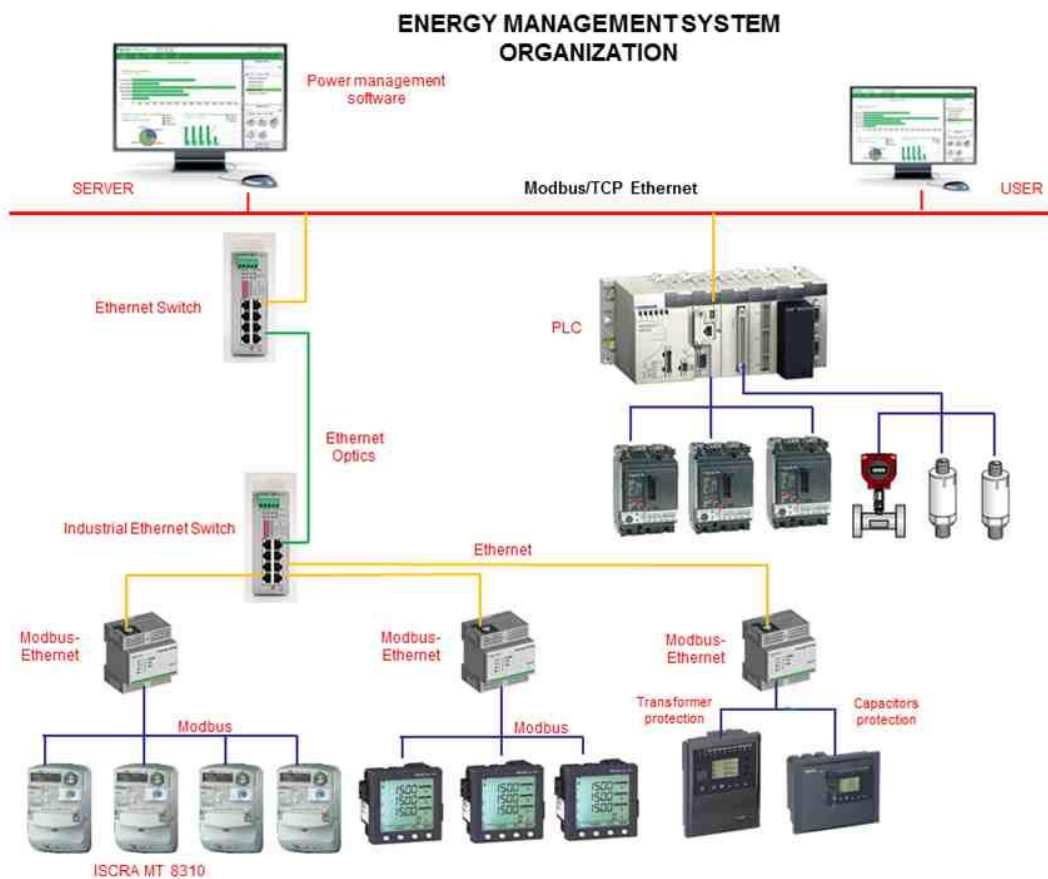
-  Cut energy-related costs, avoid downtime and optimize equipment utilization
-  Track real-time conditions, analyze power quality, and respond quickly to critical alarms
-  Study historical trends to reveal energy waste or unused capacity
-  Verify efficiency improvements and allocate costs to buildings, departments or processes

-  Manage intelligent metering and control devices
-  Provides a unified interface to display electricity and other consumable resources such as water, compressed air, gas or steam
-  Automatically collects and stores data from key electrical distribution points
-  Provides control capabilities that can be used to manage demand, power factor, loads, generators, etc.

The overall integrated system allows facility managers to collect power and other energy data from a variety of equipment and access that information from a single point. All energy-related information is then stored on a server with an installed software package which uses a database to store data. Predefined reports are also transmitted to other company users at certain time (for example, by use of e-mail communication).

EMS provide metering of all electrical units by feeders as well as metering non-electrical units in real time where needed and data transfer to a server with installed software package. By metering and displaying energy consumption data by feeders or group of feeders it is possible to generate an overview of energy consumption and loads, comparison between planned and actual energy consumption, energy consumption reduction after implementation of energy efficiency improvement measures as well as organizational measures with actions taken by industry production personnel.

The figure below shows a typical configuration of an energy management system that IMP implements in industrial pilot companies.



Picture 2: Typical Energy Management System Configuration applied at IMP Industrial Pilot Companies

4 OBJECTIVES AND APPROACH

4.1 Objectives

The USAID funded Industrial Management Project (IMP) is designed to support the USAID/Macedonia's primary objective 1.3 "Increased Job-Creating Private Sector Growth in Targeted Sectors". More specifically, the IMP activities are directed toward the accomplishment of the intermediate result IR 3.2. "Key Private Sector Capacities strengthened" and the Sub-IR 3.2.1. "Private Sector Producing Globally Competitive Products and Services" and include the following interventions in the energy sector as set forth in the USAID/Macedonia Strategic Plan 2011-2015:

- ✚ Domestic and foreign investment will expand;
- ✚ Exports from targeted competitive, value-added industries will rise;
- ✚ Employment in targeted sectors will grow;
- ✚ Business support organizations will offer new services;
- ✚ Macedonia will comply with the Energy Community Treaty; and
- ✚ Energy efficiency and renewable energy interventions will increase employment, investment, and new technology, and will reduce energy demand.

Ultimately, these interventions will lead to improvement of country's competitiveness and energy security and will simultaneously contribute to reduction of the greenhouse gas emissions.

Picture 3 below shows the IMP Results Framework.

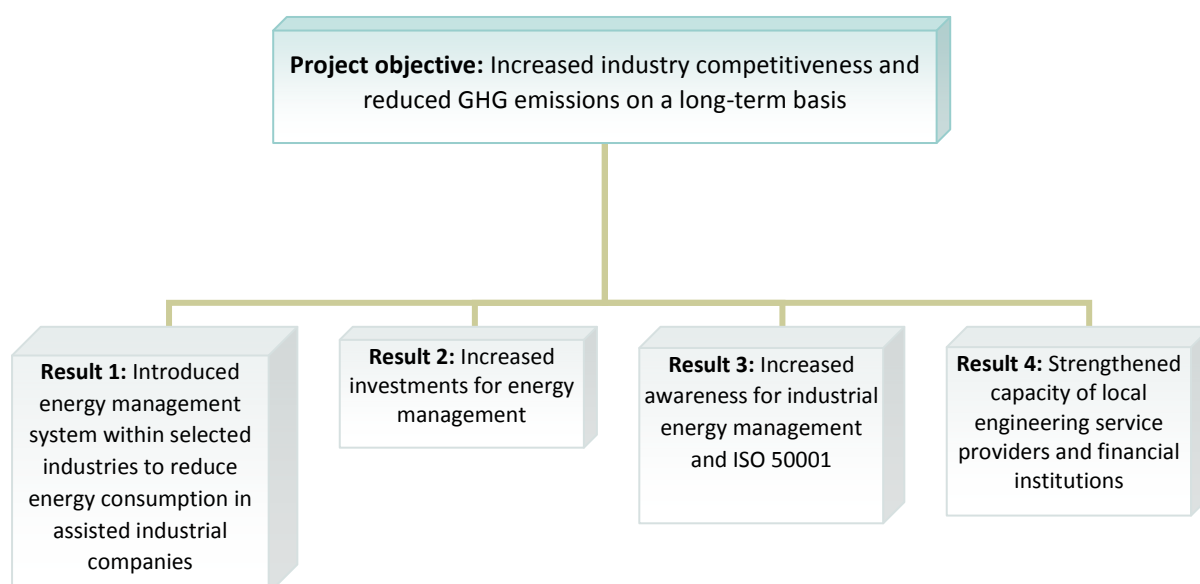


Figure 1: IMP Results Framework

The project defines the implementation framework that consists of two primary vertical tracks:

1. Increased industry competitiveness through reduced production (energy) costs, and
2. Reduced GHG emission on a long-term basis.

Furthermore, the project has four cross-cutting, horizontal tracks which contribute within the goals of the verticals, as follows:

1. Introduced energy management system within selected industries to reduce production (energy) cost in industrial companies;
2. Increased investments for energy management and energy efficiency improvements;
3. Increased awareness for industrial energy management and ISO 50001 principles;
4. Strengthened capacity of local engineering service providers for energy management systems and financial institutions for investments in industrial energy efficiency upgrades

4.2 Approach

The four major components of the IMP are: (1) Industry Selection; (2) Demonstration projects; (3) Training and Sector Development; and (4) Outreach. The primary beneficiaries of IMP are small and medium sized industrial enterprises (SME), with industrial business associations and financial institutions as secondary groups of beneficiaries. Other beneficiaries include energy utilities and NGOs. The Project aspires to cover as many of the country's regions and industrial sectors as possible.

The IMP approach is targeted towards energy consumption reduction using a systematic and sustainable way founded on ISO 50001 principles and methods. The industrial energy management is the practice of using energy more efficiently and effectively in industry's operations. Energy management provides an opportunity to optimize energy costs by understanding energy flow as well as procurement and economics of energy, and reduce its harmful impact on our environment. It is an ongoing process and must be reviewed at regular intervals and fine-tuned as required, from time to time.

The implementation of the project objectives is being accomplished by project team's approach that integrates the following key steps:

1. Introduction of Energy Management Systems (EMS) in industrial pilot companies from various industrial branches in the country. The management team and technical staff in pilot companies will receive training on the guidance, requirements and application of the ISO 50001 Energy Management Standard. Pilot projects for monitoring energy consumption by various energy types will be developed in cooperation with pilot companies. Relevant energy management systems will be installed and put into operation at the pilot companies. Designated energy managers from pilot companies will be trained on the use and maintenance of the installed system. The implementation of the energy management systems will be financed on a cost-

share basis (50% of the overall cost or not more than \$20,000) while pilot companies will cover the remaining cost.

2. Development of energy audits, project designs and implementation of energy efficiency projects in pilot companies. The energy efficiency projects will be implemented based on the collected data and system operation monitoring. IMP will also provide expert support for project financing by presentation of the EE projects to local financial institutions.
3. Provision of training of non-participant industrial companies from various industrial branches. The training will be carried out through several workshops. The companies will receive materials where, in addition to the educational part, information on the operation of and results obtained from introduced energy management systems will be also provided.
4. Provision of training for qualification of local engineering companies for development, installation and maintenance of energy management systems. The training will be carried out primarily on site at pilot companies for development and installation of the energy management systems.
5. Provision of training of local financial institutions on the needs and benefits of financing industrial energy management systems and EE development projects.

Project structure

Picture 4 shows the IMP organizational structure and project partners as a framework for successful project implementation.

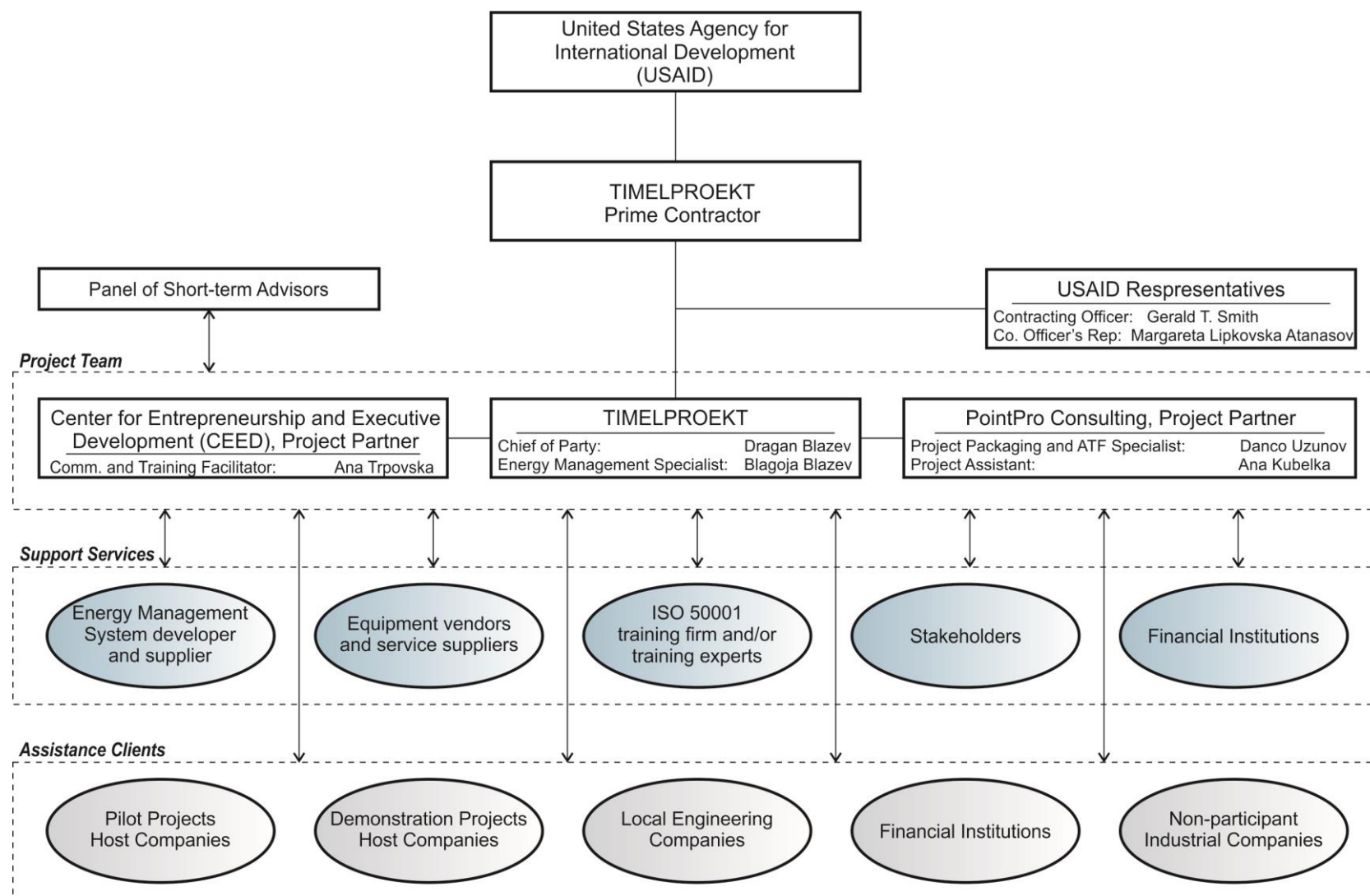


Figure 2: IMP Organizational Structure and Project Partners

5 ACCOMPLISHMENTS AND ACTIVITIES BY COMPONENTS

The four major components of the IMP are: (1) Industry Selection; (2) Demonstration Projects; (3) Training and Sector Development; and (4) Outreach.

This section provides an overview of key activities and accomplishments per component in the second implementation year of 2014.

5.1 Industry Selection

This component was fully completed in 2013. The project team continued to utilize information and knowledge gained from this component and built upon it.

In 2014, the project team started to develop a database of candidate companies as a target group. At present, IMP developed a database of more than 400 companies. The database is work-in-progress, which final version will be delivered to USAID.

5.2 Demonstration projects

Access to energy is becoming more costly and environmentally damaging in Macedonia. Finding ways to reduce costs and environmental impact and increase competitiveness of organizations is of outmost importance. Although there is a market movement towards improving energy efficiency in economy with the on-going market liberalization process, the industry focus is dictated by market forces demanding priorities to be aimed towards market expansion combined with combating growing illiquidity and political instability in the country that increases risks of doing business.

To address opportunities for increased competitive growth that are possible through reduction of production costs, there is a need for a new energy paradigm reconciling the economic and prosperity growth for companies' sustainability. Energy management must be a part of such a paradigm change.

The excessive energy costs incurring due to inefficient energy use in Macedonian industry continue to significantly affect the competitiveness of industrial products on domestic and regional markets. The utility costs reduce profits, erode capital and maintenance budgets, and increase product costs. The Macedonian industry accounts for more than a third of the national primary energy consumption and greenhouse gas emissions, it participates with more than 28% of GDP, and employs over 30% of labor workforce.

In the ongoing economic and financial crises lead to reduced trade and business activity, companies look for ways of improving their competitiveness through internal cost reduction. The inclusion of well-structured energy management as a systematic approach to track energy use and optimize energy demand helps industrial plants in continuous process improvement and increased competitiveness.

In 2015 IMP expanded the project working closely with contracted pilot companies, discussing and inviting new customers, training beneficiaries, and marketing the project through various channels and venues.

However, IMP faced several challenges that influenced the progress of project and shifted scheduled project results. These challenges evolved from the Government decision to postpone electricity market liberalization, illiquidity issues of companies caused by ongoing economic crisis and increased internal debt in the country, elections in 2014 and resulting political instability in the country, as well as existing factors such as low awareness of the benefits of energy efficiency in industrial companies, partly due to lack of metering and control devices.

Electricity market liberalization

The 2015 liberalization of the national electricity market brought 223 companies become qualified consumers on April 1, 2014. The results show that electricity market liberalization resulted with financial savings from electricity consumption in range of 15-20% to this group of companies. These positive results were contributed to difference in methodologies of calculating electricity consumption on the open electricity market compared to the regulated electricity market. The price difference, however, did not bring any actual electricity savings but only financial savings, which improves bottom lines of companies, and thus make them more competitive.

However, the Macedonian Government decided to delay the full liberalization of the electricity market set for January 1, 2015 to implement it in five phases beginning of July 1, 2016 conclusive with July 1, 2020. The Government plan reported that instead of completing the liberalization plan on January 1, 2015, it was proposed companies with total electricity consumption of more than 1,000 megawatt-hours in 2015 to become eligible for market liberalization on July 1, 2016. This category would include about 100 customers with total expected consumption of 300 gigawatt-hours of electricity. The next phase should begin on July 1, 2017 when companies with approximately 150 customers with an expected consumption of 300 GWh per year would become eligible for market liberalization. On July 1, 2018 consumers with realized electricity consumption of more than 100 megawatt-hours in 2017 and 900 customers with expected annual consumption of 300 GWh would become eligible for market liberalization. The fourth phase should begin on July 1, 2019 consumers with a consumption of more than 25 megawatt-hours in 2018 or about 3,500 customers with expected annual consumption of 300 gigawatt-hours would become qualified. The final, fifth phase should begin on July 1, 2020 and the market will be liberalized for the remaining small customers and approximately 600,000 households with a total annual consumption of about 3,200 gigawatt-hours.

The decision of postponement was taken after government's analysis indicated that household electricity bills would increase from 17.7% to 20.0% if planned liberalization started in January 2015.

Following Government's decision on postponing electricity market liberalization, EEC representatives of have criticized the decision to delay the full liberalization of the electricity market until 2020, saying that the move is "a very clear breach of the Energy Community Treaty," which stipulates that the market should be open as of 1 January 2015. EEC questioned Macedonia's claim that prices will rise on liberalization, warning that such a decision is even less understandable taking into account the fact that the electricity market in Macedonia for bigger consumers is already liberalized, competition exists, and the results are very encouraging for everybody except a monopolistic electricity provider.

Back in 2008, Macedonia launched a partial opening of the market, allowing large industrial companies to choose their suppliers. In April 2014, this was extended to medium-sized companies - calculated as those with over 50 employees and an annual turnover or total assets of more than €10 million.

This event of postponing electricity market liberalization had a negative impact to the Industrial Management Project because the customers which introduced the energy management systems based on, among other benefits, the ability to track and plan electricity consumption and thus become ready for market liberalization, could not do so because they did not meet the eligibility criteria of annual turnover of EUR 10 million and more than 50 employees. On the other side, companies that were preparing to enter the liberalized market discussed with IMP on introducing energy management system in their production plants. However, the Government decision on postponing market liberalization shifted their focus on priorities to other investment areas.

Liquidity issues of Macedonian companies

According to Central Bank data, more than third of Macedonian companies had their accounts frozen and not able to operate with payments. The liquidity issues roused in the country, therefore influencing project team efforts to convince management boards to invest in energy management systems and energy efficiency upgrades. IMP's partner organizations, the Chambers of Commerce were instrumental in defining the problem. "In times of severe economic crisis and liquidity problems the government can help the most," said Mirce Cekredzi, the vice-president of Macedonia's Association of Economic Chambers. He urged the Government to provide more favorable credits for companies so that they can stay liquid and survive low demand on the market. Moreover, companies face "chronic liquidity problems" and there are no signs of change for the better, the association said.

Other reports from international financial institutions in their latest report predict a difficult year for all countries in the Western Balkans. They forecasted shrinking economic activity generally, as well as rising unemployment.

Macedonian companies, in particular SMEs, are challenged with liquidity issues when financing their operations. Amid shrinking exports caused largely by the European crisis, SMEs face tough time to secure financing given large requirements in collateral from banks extending loans. A large portion of Macedonian companies, in particular small enterprises, have frozen bank accounts because of their financial liquidity problems.

Local banks became more conservative in extending loans despite unchanged demand for credit from the private sector. Domestic companies secure financing primarily from their own cash flow, due to lack of corporate bonds or securities as alternative credit instruments. Because of the scarcity of other private financing, credit demand is high, affecting interest rates. In addition, some companies reported that delaying of public sector payments to the private sector contribute greatly to the liquidity problem in the country.

Among few other issues, liquidity problems on the market and postponing the market liberalization had negative impact on the outcome and slowed down the decision-making process by top managements at companies that were strongly committed to implement EnMS.

Amid this financial issues that impact companies daily operations, IMP continued to offer cost-sharing support to manufacturing companies for introducing energy management systems and technical support for improving energy efficiency and thus reducing costs that improves bottom line.

Low awareness of industrial energy management

Significant potential for sustainable energy investments remains untapped in Macedonia while improvement in sustainable energy still faces many barriers. These barriers include lack of awareness of the benefits of energy efficiency, partly due to lack of metering and control devices and lack of technical knowledge, as well as difficulties to access financing for sustainable energy projects.

As the case in the first project year, in 2014 IMP concluded that most visited candidate companies own out-of-date power distribution installation built from 30 to 40 years ago and generally utilize old equipment. Such conditions increase EMS investment cost in companies. Moreover, companies lack technical project documentation for existing and running power distribution networks, installed equipment and for the overall energy installations. Therefore, increased level of effort was invested to prepare project plans and cost specifications for cost-shared EMS. In addition, the team concluded that maintenance of energy installations in candidate companies is insufficient and often companies don't have sufficient trained or qualified personnel for it.

To address this, IMP is sharing information with companies' management boards on potential to improve their businesses by reducing energy costs. Apart of on-site training on energy management system operation, IMP organized and conducted three 2-day trainings on ISO 50001 standard and energy management best practices, which activities are presented in more detail in section 5.4. IMP will continue to address and improve the lack of knowledge on opportunities to improve energy management in industrial companies. In this regards, introducing energy management practices which includes energy monitoring and controlling in industrial processes is a critical element towards sustainable energy future.

5.2.1 Accomplishments

Under this component, the development of Energy Management pilot projects is the key component under the Industrial Management Project. Under this component, to date IMP has accomplished the following results:

- Contracted 12 industrial companies for EnMS implementation;
- Supplied, installed, tested and commissioned EnMS at 10 pilot companies and trained companies' personnel in the year 2014 alone. There is an ongoing EnMS implementation at 2 companies. IMP ordered the cost-shared energy management systems and will continue with system installation and provide on-site training to plant managers and technical staff tasked with energy-management related activities;

- Developed EnMS specs (including blueprints) and cost proposals for additional 21 candidate companies, which did not agree to continue with EnMS implementation after initially given strong commitment by their top managements;
- Discussed interest for EnMS implementation to at least other 40 industrial companies that met initial project eligibility criteria;
- Provided technical assistance and access to finance support to Alkaloid, the pharmaceutical pilot company that asked for IMP support. IMP's expert team conducted a detailed energy audit with recommendations for the most suitable interventions at the laboratory building and prepared an eligibility assessment according to EBRD's WebSEFF criteria as part of company's loan application, which was approved and successfully funded through NLB Tutunska Bank. With full implementation of the energy efficiency upgrades in Alkaloid's laboratory building, the company shall save 36.8% in energy consumption (natural gas and electricity) of the building, or EUR 44,739 (excluding VAT) annually. With 22.3% Internal Rate of Return, the investment shall be paid back in 4.5 years.

IMP continued to promote the project through various channels and venues, and offer USAID cost-sharing support to businesses. Contracted in 2014, IMP targets to conclude EnMS implementation in 2015. Our strategy is based on **securing top management commitment**. IMP knows that the top management commitment is more than a statement of support – it establishes accountability among managers involved in the implementation of the strategy, and it requires regular reporting on progress. Our following step is establishing energy management team and training it, introducing roles and responsibilities, identifying opportunities for improvement, designing a roadmap, taking actions and checking. The process requires focus, drive, a systematic approach and above all, a willingness to change and improve.

Based on the principles on ISO 50001 standard and lessons learned from experiences from other countries worldwide, the top management commitment is the key for successful energy management system implementation and continued improvements through follow-on energy efficiency upgrades from no cost/low cost to high cost measures. It is through action that companies could learn to improve competitiveness and bring forward a culture of continuous improvement. IMP introduces standardized process improvement methodology that allows looking at how beneficiary companies perform work.

Although the project team is committed and works hard to promote and educate companies on the long-term benefits of EnMS introduction and use, the results for contracted and implemented pilot companies are not as expected due to various external causes and circumstances that had impact on the project. The project experienced delays in responding on cost proposals from prospective companies. In few cases, even though the management decided to go forward with contract for EnMS implementation, it was then decision either delayed or canceled. Although the project team and design engineers were proactive in reaching the project objectives with increased level of effort, we identified that in a number of cases the top management does not prioritize energy management practices and that there is a lack of true management commitment in activities that could lead to reducing energy consumption and cutting energy costs.

In order to tackle external factors and meet the project target, IMP continued to use the same strategy and development process but also enlarge and expand into the following activities:

- **Direct call to prospective companies.** The team uses own developed databases, chambers of commerce, on-line portals, newspaper articles and other leads to reach out to potential customers.
- **Networking.** IMP continued to attend conferences, seminars, trade shows, round tables and other business venues where there are potential customers. IMP is continuously involved in energy-related events organized by the Economic chamber of commerce, as well as other promotional events such as conferences organized by the U.S. Embassy, the power distribution utility EVN Macedonia, the City of Skopje, and other stakeholders.
- **Testimonials by EnMS champions.** IMP utilized the pilot projects as good examples to showcase their satisfaction and results to help generate references and referrals to other potential customers. The experience of EnMS at pilot companies is very positive, and as such can be used as strong reference to other companies, a marketing tool that IMP was lacking when the project started. Once EnMS are installed and running, pilot companies help IMP sell to others by offering positive testimonials and leveraging a refer-a-friend campaign created by the positive experience. This technique also employs word-of-mouth marketing including the old management adage “You can't manage what you don't measure.”

One of the reasons we implement the energy management system is to improve our competitiveness, which is especially important for us as an export oriented company. The installed system provides us with real-time data and helps us to have an actual illustration of the company's energy use at any moment. And, with the liberalization of the electricity market, we expect another benefit from the system – being aware of the exact company's energy consumption; we will be able to make our calculations while purchasing energy. That's how we will make additional savings.

ZDRAVJE RADOVO, DAIRY PRODUCTS COMPANY, PROJECT BENEFICIARY

- **Advertising.** Within the capacity and project budget, IMP explored ways to advertise the project by use of promotional leaflets distributed along with newspaper or magazine. For example, IMP had already two discussions describing project scope and benefits with “Economy and Business” monthly magazine. Therefore, IMP will discuss potential to further advertise the project by utilizing the magazine that is widely distributed to and used by businesses. On the other hand, IMP will continue to advertise the project on various venues. To date, the team promoted IMP and delivered presentations at round tables, conferences, seminars and promotional events to at least 100 relevant industrial companies.

Taking advantage in postponing electricity market liberalization, IMP presented and will continue to explain that the postponing of electricity market liberalization is an opportunity for companies to become aware and prepare for it in the timeframe that is scheduled for their inclusion to the open electricity market. EnMS implementation is a wise choice for top management to invest in and get ready to track electricity consumption, contract negotiation with electricity suppliers, and providing secure energy supply and cutting costs by the time when market liberalization comes in.

Based on past experience and results, IMP estimates that at least additional 15 companies need to be screened on-site and cost specifications prepared and submitted in order to result with 5 signed contracts for EnMS implementation in 2015.



Picture 3: EMS Configuration at Veze Sharri, Trebosh, Tetovo

Close cooperation with company's management and competent technical staff from potential companies are maintained for successful project implementation. Key elements that are critical for EnMS development at pilot companies are:

- Analyzed questionnaire's input
- Secured Top Management Commitment
- Appointed Energy Coordinator from potential company
- Conducted on-site energy installation screening
- Organized energy and technical data
- Prepared detailed USAID cost-shared cost specification and project plans

The project team pursued all identified key elements for EnMS development and installation to include them at prioritized host companies. In order to reduce total EnMS costs in hardware and software, the project team presented a unified approach for project application to interested industrial companies.

Establishment of an energy management team is considered at all pilot industrial companies. The purpose of forming an energy management team is to engage it in EnMS operation and furthermore initiate and propose measures for improvement. The role of the team is to report to the top management for the process of EnMS operation, indicators, conclusions and recommendations. The

team is trained for EnMS operation. Its duty is to report on the performance of the system to the top management, ensure that EnMS is fully operational and maintained properly as well as to provide recommendations for improvement.

Moreover, the IMP team presented necessary information to top management about selected vendors of Energy Management Systems, including software tools, measuring devices, and computer and telecommunication equipment. IMP provided answers, relevant explanation and all necessary sources to potential beneficiaries in order to assist them in selecting one of the two equipment vendors for EnMS implementation, Schneider Electric or Janitza.

Training of ISO 50001 energy management guidelines was organized and conducted for all contracted pilot companies. Training was conducted for managers and staff tasked with energy management related activities, including technical specialists who operate energy intensive equipment. There is an introductory ISO 50001 training at pilot companies coupled with EnMS operation training. Following the introductory training, the participants receive ISO 50001 materials at the EnMS commissioning. However, representatives from pilot companies were invited to participate at the comprehensive and in-depth two-day training that IMP jointly organizes with UNIDO.

At the end of the overall training the participants at minimum are able to:

- ✓ understand the guidance and application for ENMS provided by ISO 50001;
- ✓ explain the purpose of ISO 50001 and the benefits to an organization of using ISO 50001;
- ✓ outline key concepts and approaches for an energy management system;
- ✓ describe, with reference to Plan – Do – Check – Commit cycle, the structure, scope and purpose of ISO 50001 standard;
- ✓ outline key ISO 50001 definitions and terminology;
- ✓ outline the key requirements of ISO 50001 standard.

After EnMS installation and commissioning, IMP assisted pilot companies in collection and evaluation of energy and cost data. Prior to start of data collection and evaluation, IMP designed and developed Metering and Verification (M&V) Plan. It uses measurement to reliably determine actual savings created within an individual facility by the energy management system. Savings cannot be directly measured since they represent the absence of energy use. Instead, savings are determined by comparing measured energy use before and after EnMS implementation combined with energy efficiency project upgrades, and making appropriate adjustments for changes in conditions. M&V activities consist of data collection and screening, using of a computation method and acceptable estimates, computation with measured data, and quality assurance and reporting. The verification of potential to achieve savings, however, involves regular site inspection of equipment, at least one per quarter to pilot companies.

The organization of EnMS data collection is provided by use of the installed EnMS for data acquisition in pilot industrial companies. This way there is a continuous monitoring of EnMS operation. IMP shall provide monthly, bi-monthly or quarterly reports of energy use as essential

feedback for making energy management visible to both plant management and department level staff. Conservation measures performance and periodical reports for energy intensity, energy usage, and cost data is evaluated for the management to see the benefits of installed EnMS. Based on measurement results, IMP assists pilot companies to identify weak points in energy consumption and further assist them in analyzing potential measures, planning interventions, and access to investments.

Where interested, the IMP will obtain agreement from pilot companies on the energy efficiency improvements that they want to pursue and their willingness to share the cost of an energy efficiency audits as well as willingness to seek external financing for implementation of potential energy efficiency upgrades. The IMP conducts audits as necessary and explores alternative financial options and assists pilot companies in project preparation for approaching the financial sector. Although this activity has started in 2014, the focus of this activity is subject for completion in 2015. Overall, six (6) demonstration pilot companies are to be selected that are willing and committed to implement energy efficiency upgrade projects and develop engineering designs for cost-effective measures. The upgrade projects target energy savings from various energy carriers, such as electricity, oil, natural gas, steam, compressed air or derived heat.

Successful implementation of the demonstration projects requires moving beyond the apparent identification of energy efficiency measures towards significantly more detailed project planning and preparation. The pilot companies' top management makes decision on financing options, which should result in execution of tangible upgrades and improvements of companies' operating energy efficiency profile.

IMP uses measured data to calculate the impact of implementing possible energy efficiency upgrade measures, which shall be supported by the provision of relevant data (e.g. energy, equipment, production, and operational data) as available. In addition, IMP combines available information with relevant experience and best practices to provide recommendations that could enhance the performance of the measures presented. At minimum, the report shall include:

- a detailed assessment of opportunities identified
- the anticipated quantity of sustainable energy to be saved
- the anticipated quantity of emissions avoided or material efficiencies that may result
- an assessment of the cost to implement the measures presented
- an assessment of project profitability with assumptions clearly defined
- recommendations that could enhance the performance of the measures presented including a preliminary estimate of cost-benefit and risk for each recommendation
- supporting documentation / assumptions / calculations / diagrams / project plans

After the technical evaluation of project upgrades, IMP provides access to finance activities to help demonstration pilot companies raise capital for project financing. In general, these activities may include:

- Capital budgeting and O&M cost determination
- Detailed project cash flow and feasibility analysis using the Discounted Cash Flow (DCF) model
- Detailed energy management improvements implementation planning based on the project cash flow analysis against the company's overall mid-to-long-term business development strategy and plans
- Preparation of comprehensive bankable project documents
- Support to demonstration projects pilot companies in accessing financial institutions or equity capital sources and securing funds for project implementation

Over the course of 2014, IMP installed cost-shared energy management systems and provided on-site training to plant managers and technical staff tasked with energy-management related activities at 10 pilot companies. The table below shows the pilot companies fully completed and commissioned in 2014.

#	EMS Project Beneficiary	Contract signature date	EMS commissioning date	# of metering points	# of locations	Software package	Manufacturer /Equipment vendor	EMS System Integrator	Contracted value (VAT Excl.) USD	USAID cost-share (VAT Excl.) USD
1.	Alkaloid AD, Skopje	October 15, 2013	February 07, 2014	22	3 Avtokomanda Bilka Lafoma	Monitoring and balancing	Schneider Electric	Iring, Skopje	41,366	20,000
2.	Hi-Tech Corporation, v. Radishani, Skopje	September 10, 2013	February 03, 2014	22	1	Monitoring	Janitza Germany	Loging Electronics, Skopje	37,012	18,506
3.	Promes, Skopje	November 22, 2013	March 25, 2014	11	2 Production plant, Shop GTC	Monitoring and balancing	Schneider Electric	Iring, Skopje	29,650	14,825
4.	Specijal Produkt, Skopje	November 21, 2013	March 18, 2014	13	11 Production plant, 10 shops - Skopje	Monitoring and balancing	Schneider Electric	Iring, Skopje	36,706	18,353
5.	Knauf Radika, Debar	December 16, 2013	February 19, 2014	45	1	Monitoring	Janitza Germany	Loging Electronics, Skopje	48,190	20,000
6.	Makprogres, Vinica	December 02, 2013	June 05, 2014	28	2 Production plant, Admin. building	Monitoring and balancing	Schneider Electric	Iring, Skopje	55,419	20,000
7.	Mlekara Zdravje, v. Radovo, Strumica	February 07, 2014	July 04, 2014	6	5 Skopje, Kumanovo, Sveti Nikole, v. Radovo, v. Vasilevo	Monitoring and balancing	Schneider Electric	Iring, Skopje	25,600	12,800
8.	Vivaks, Skopje	December 17, 2013	July 01, 2014	13	1	Monitoring and balancing	Schneider Electric	Iring, Skopje	27,360	13,680
9.	Veze Sharri, v. Trebosh, Tetovo	April 29, 2014	December 05, 2014	18	1	Monitoring and balancing	Schneider Electric	Iring, Skopje	34,310	17,155

10	Nova Refraktori, Pehchevo	September 01, 2014	December 12, 2014	3	1	Monitoring	Schneider Electric	Iring, Skopje	19,472	9,736
TOTAL:									355,085	165,055

In the last quarter of 2014, IMP negotiated and signed contracts for EnMS installation with two other companies that are scheduled for completion by end of April 2015 as indicated below.

#	EMS Project Beneficiary	Contract signature date	# of metering points	# of locations	Software package	Manufacturer /Equipment vendor	EMS System Integrator	Contracted value (VAT Excl.) USD	USAID cost-share (VAT Excl.) USD
1	Skopski Leguri, Skopje (IMP technical support)	December 04, 2014	/	1	Monitoring and balancing	Schneider Electric	Iring, Skopje	58,940	19,333
2	Duropack, Skopje	January 14, 2015	13	1	Monitoring	Schneider Electric	Loging Electronics, Skopje	38,801	19,401
TOTAL:								97,741	38,734

Besides accomplishing the results above, in 2014 IMP engineers conducted set of activities to prepare detailed EMS cost specifications in candidate companies that expressed initial top management commitment but later on decided not to implement the systems. Activities included:

- ✚ Conducted energy consumption analysis (electricity and other energy consumables) in industrial companies;
- ✚ Performed on-site surveying of existing energy infrastructure network utilizing electricity and other energy consumables;
- ✚ Prepared technical documentation for the energy infrastructure network including single line diagrams, distribution panel boards and connections to consumers; technical data were communicated with and approved by technical staff from candidate industrial companies;
- ✚ Prepared technical solutions for EMS and its configurations including measurement and data acquisition devices and telecommunication equipment;
- ✚ On-site visit to all locations including selection of possible places for installation of EMS measurement and telecommunication equipment;
- ✚ Prepared scope of work with detailed cost specification for each EMS and submitted for companies' consideration.

The table below shows the candidate companies that have received technical solutions including cost specifications for Energy Management System integration in their production plants by the end of 2014.

#	Company	Date of submission of documents	# of metering points	Software package	Contracted value (VAT Excl.) USD	Status
1.	Vardar Dolomit, Gostivar	July 17, 2013	18	Monitoring and balancing	53,438	Company decided NOT to continue with EMS implementation
2.	Brako, Veles	July 17, 2013	45	Monitoring and balancing	63,343	Company decided NOT to continue with EMS implementation
3.	Bato&Divajn, Skopje	July 31, 2013	21	Monitoring and balancing	41,617	Company decided NOT to continue with EMS implementation
4.	Pelagonija Separacija, Gostivar	August 19, 2013	9	Monitoring and balancing	25,516	Company decided NOT to continue with EMS implementation
5.	Frotirka, Delcevo	August 19, 2013	25	Monitoring and balancing	46,164	Company decided NOT to continue with EMS implementation
6.	Konti Hidroplast, Gevgelija	October 01, 2013	28	Monitoring and balancing	49,638	Company decided NOT to continue with EMS implementation
7.	Confy-Angel, Prilep	October 02, 2013	32	Monitoring and balancing	54,357	Company decided NOT to continue with EMS implementation
8.	Fabrika za kabli, Negotino	November 20, 2013	40	Monitoring and balancing	59,100	Company decided NOT to continue with EMS implementation
9.	Frotirex, Skopje, Strumica	November 22, 2013	15	Monitoring and balancing	33,965	Company decided NOT to continue with EMS implementation
10.	Zito Oriz, Kocani	November 26, 2013	16	Cost specification and balancing	33,925	Company decided NOT to continue with EMS implementation
11.	Vitaminka, Prilep	January 17, 2014	6	System upgrade	36,474	Company decided NOT to continue with EMS implementation
12.	Margoni, Skopje, Kratovo	February 28, 2014	13	Monitoring and balancing	36,829	Company decided NOT to continue with EMS implementation
13.	Feniks Farma, Skopje	March 26, 2014	10	Monitoring	20,131	Company decided NOT to continue with EMS implementation
14.	Elenica, Strumica	April 25, 2014	23	Monitoring	36,552	Company decided NOT to continue with EMS implementation
15.	Pelisterka, Bitola	April 25, 2014	8	Monitoring and balancing	25,791	Company decided NOT to continue with EMS implementation
			7	Мониторинг	23,513	
16.	Blagoj Gjorev, Veles	May 02, 2014	24	Monitoring and balancing	46,414	Company decided NOT to continue with EMS implementation
17.	Grozd, Strumica	May 09, 2014	18	Monitoring and balancing	37,832	Company decided NOT to continue with EMS implementation
18.	Wabtec MZT, Skopje	July 25, 2014	24	Monitoring and balancing	43,110	Company decided NOT to continue with EMS implementation
19.	Learnica MZT, Skopje	September 03, 2014	29	Monitoring and balancing	40,649	Contract submitted for signature
20.	Energetika MZT, Skopje				39,912	
21.	Bratstvo Galvanizacija MZT, Skopje	November 14, 2014	9	Monitoring	16,470	Company decided NOT to continue with EMS implementation

Additionally, more than 40 companies were directly approached and meetings were held with management representatives and technical personnel.

Energy Efficiency Upgrade Projects

As a pilot company, Alkaloid was the first beneficiary company with installed EnMS to approach project team and asked for technical and access to finance support.

The company planned to insulate its A1 building envelope. The building is used for production of pharmaceuticals. The building was built in 1970. It includes several production segments: liquid manufacturing, oil and ampoules' production, and quality control segment. The total conditioned

area is 2,654 meters squared is heated. The building has five levels: basement, ground floor and three floors. To date, neither significant reconstructions nor other work activities on the building have been carried out. The outside walls and the flat roof do not have any thermal isolation. The existing windows have aluminum profiles with one or two glazings.

In order to increase energy efficiency of the building and improve the comfort and working environment, the company plans to insulate the building envelope, which includes: installation of thermal insulation on outside walls, construction of new roof with thermal insulation, and installation of new energy efficient windows.

IMP prepared detailed energy audit with recommendations of several measures to increase energy efficiency of the building. This project was also eligible for financing under the WeBSEFF as an energy efficiency sub-project, which is implemented on energy demand-side. The Energy Saving Ratio (ESR) was greater than 20% (36.8% for this sub-project) and has a payback period of 4.5 years. The reduction of greenhouse gases emission was greater than 20% (30.1% for this sub-project). The requested loan amount is 200,000 EUR. The Internal Rate of Return (IRR) based on the energy savings as result of building retrofit was greater than 10% (22.3% for this sub-project) over an economic life-time of 30 years. The implementation of this sub-project increased the energy efficiency of the building.

Summary of Investment Opportunities							
No.	Description of Measure	Estimated investment (EUR)	WeBSEFF loan (EUR)	Estimated savings (EUR/a)	IRR (%)	NPV (EUR)	Simple payback (years)
1.	Insulation of A1 building envelope at Alkaloid AD	200,000.00*	200,000.00	44,739.00	22.3	485,858.00	4.5

*Without VAT

Summary of energy saved/generated					
No.	Description of Measure	Final energy savings (MWh/a)	Primary energy savings (MWh/a)	Renewable energy production (MWh/a)	Equivalent primary renewable energy generation (MWh/a)
1.	Insulation of A1 building envelope at Alkaloid AD	774.90	1,127.45	0	0

Summary of Avoided CO ₂ Emissions and Other Resource Savings				
No.	Description of Measure	Avoided CO ₂ emissions (kg CO ₂ /a)	Ratio of avoided CO ₂ emissions to emissions before [%]	Ratio of primary energy to CO ₂ emission $EE \left[\frac{MWh}{tCO_2} \right]$
1.	Insulation of A1 building envelope at Alkaloid AD	319,746	30.1 %	3.53

Investment Incentives	
Percentage applied (%)	Estimated incentive amount (EUR)
8.70 %	17,394.40 EUR

Eligibility Summary		
Requirement	Actual	Eligible y/n
Energy Saving Ratio - ESR (> 20%)	36.8 %	y
Internal Rate of Return - IRR (> 10%)	22.3 %	y
Reduction of Greenhouse Gases Emission – RGHGE (> 20%)	30.1 %	y
Capacity expansion (less than double)	0 %	y
Eligibility status	The project proposal package was eligible for financing in the present stage.	

This eligibility assessment was approved for financing by the European Bank for Reconstruction and Development under the WebSEFF II regional financing facility.

The IMP technical and access to finance support resulted after the Energy Management System was commissioned at Alkaloid. The picture below shows the meeting of acceptance at the company's premises



Picture 4: Acceptance of EMS in Alkaloid AD Skopje

5.3 Training and Sector Development

Under this component, IMP is tasked to aid develop the market of local service providers for EnMS development, installation and maintenance services.

In 2013 IMP selected two engineering companies for training, Filbis and Energoprojekt MIGO. They signed contracts with IMP to join the project and use the benefits of theoretical learning and gaining practical on-site experience on development, installation and maintenance of energy management systems.

The objectives of the overall training are to:

- ✓ introduce the trainees with the USAID Industrial Management Project,
- ✓ familiarize the trainees with the Energy Management System (EMS) concept in an industrial company as well as with the basis of the ISO 50001:2011 Energy Management Standard including introduction of its methods, requirements and scope of use;
- ✓ Introduce the practicalities and applicability of Energy Management Systems (hardware equipment and software solutions) by selected vendors of Schneider Electric based in France and Janitza based in Germany. The Energy Management Systems shall be integrated in the pilot companies by the local system integrators: Iring company, licensed by Schneider Electric, and Logging Electronics company, licensed by Janitza.
- ✓ elaborate the planning and development process of Energy Management Systems at industrial pilot companies by monitoring systems' operation.
- ✓ train companies on preparation of project technical documentation for EMS implementation;
- ✓ provide hands-on experience on installation of metering and telecommunication equipment in power distribution networks and facilities, installation of computer equipment for EMS on site at industrial pilot companies; and
- ✓ participate in installation, programming and setting parameters, including participation of a complete User's adaptation of energy management software at industrial pilot companies.

In the first stage, these companies acquired theoretical knowledge on Energy Management Systems. They were provided with the full set of materials and specifications on energy management systems and discussed about project activities and accomplishments.

As a next step, companies learned that the success of an EMS projects at candidate companies chiefly depends on:

- 1) Complete specifications — what is wanted, clearly stated
- 2) Quality hardware and software — what is used to meet the specifications
- 3) Competent players — who puts it all together
- 4) Commissioning — verifying and fine-tuning what was specified

In order to gain practical experience on these critical steps, both companies were introduced and trained on the following procedures of EnMS implementation cycle:

Documentation

Under IMP, we utilize the design-build approach as a procurement method. In this approach, IMP engineers develop performance specifications which are provided to qualified vendors and then negotiated with a targeted firm. For the purpose of building a specification, both companies joined IMP engineers team on two selected pilot companies, Veze Sharri and Nova Refraktori. Both companies worked along with IMP engineers to inspect energy installations on site and generate single-line diagrams of respective substations.

Procurement

Once documentation was ready, a cost specification was generated based on discussion and background information with the vendors and preferences of the candidate companies. IMP reached agreements for procurement and installation of energy management systems at Veze Sharri and Nova Rafraktori, which information was shared to both engineering companies. The hardware and software of the technical solution which was agreed accordingly were ordered from the selected vendor.

Installation and Commissioning

The success of a controls project depends more on the individuals hired to design and install the system than on the hardware and software chosen. Once equipment was delivered on site, technical staff from both companies took part in actual implementation on site. The first engineering company Filbis was engaged in the equipment installation at Veze Sharri, while the second engineering company Energoproekt MIGO took part in equipment installation at Nova Refraktori. Once systems were installed and tested, commissioning was scheduled at both companies.

O&M Manual

Once the installation was completed, the team participated in developing the Operation and Maintenance Manual as part of the project documentation that is prepared and handed over to pilot companies.

Training

Key to the full utilization of an EMS is the training of facility staff. The staff from both engineering companies took part on the training conducted to the staff of pilot companies. They learned the specifics of delivery effective training and answering questions raised by trainees.

Given that the project shall continue with implementation of energy management systems at new manufacturing companies in the following year, both engineering companies expressed interest and eagerness to be involved in the implementation activities at other companies. IMP will consider their request and engage them in training activities of other projects in the following year.

5.4 Outreach

5.4.1 Key Activities

In the second year of its implementation, the Industrial Management Project continued to carry out communication & outreach activities as defined in the project contract and Annual Work Plan of 2014. The promotional events and materials were aimed to raise public awareness about project goals, implemented approach and achievements of both, primary project audience – local industrial companies, and secondary audience - chambers of commerce, Ministry of Economy, Ministry of Environment and Physical Planning, engineering companies, environmental NGOs, international donor organizations, Macedonian Energy Agency, local and national media... For this purpose, IMP used a variety of communication and outreach tools, including organization of round tables, workshops and press conferences, production and dissemination of information via promotional materials and media interviews. Press releases and press clippings about IMP's work, when applied, were regularly submitted to USAID mission office. Besides the main message that the IMP was conveying in each of its promotional activities, the project also branded all materials and events in accordance with the Project's Branding Implementation Plan and Marking Plan.

Information on C&O outputs by specific outreach medium is provided below.

5.4.2 Accomplishments

IMP Events

USAID – UNIDO cooperation on USER Training workshops

In 2013, as part of its capacity building activities, the USAID IMP has started cooperation with the United Nations Industrial Development Organization (UNIDO) project on industrial energy efficiency in Macedonia, which official launch is expected in January 2015. As a follow-up to this successful collaboration, in 2014 the teams conducted three two-day joint workshops on ISO 50001 standard and energy management best practices.

The workshops were held on March 18-19, November 24-25 and on November 27-28, 2014. Around 60 participants representing 39 organizations attended the trainings, most of them being engineers, middle or top managers from the local industrial companies. The offered trainings focused on energy management principles and ISO 50001 standard, including development of energy information and plans, presentation of energy metrics and energy performance indicators, discussions of management commitment, checking, management review and project planning. The companies were also familiarized with the basic concepts of project financing and financial analysis for project comparison. The selected EMS vendors Schneider Electric from France and Janitza from Germany presented the concept, operation, benefits and advantages of the energy management systems they offer.

Liam McLaughlin, a UNIDO's expert with extensive professional experience on ISO 50001 Energy Management Standard, led the joint training.



Picture 5: USER Training workshop – Skopje, November, 2014



Picture 6: Participants discussion on the USER Training workshop – Skopje, November 27-28, 2014

The training enabled productive discussions among participants about the effective use of the energy management system that will help the companies to manage their energy use in a sustainable way. They also discussed management commitment, possible improvements in currently used technologies and best operation practices in order to achieve significant and sustainable cost reduction in energy use in their companies which will further lead to increased companies' competitiveness and reduced environmental impact.

IMP provided training materials to all participants which included all presentations from the workshop. In addition, all participants received the *Practical Guide for implementation of Energy Management System* and the *Excel User toolkit*. These materials were prepared in 2013 for

promotion of ISO 50001 standard and to be disseminated to participants on workshops and other IMP's events.

Participation in World Energy Engineering Congress (WEEC)



Picture 7: World Energy Engineering Congress – Washington, DC, September 2014

Dragan Blazeov, IMP Chief of Party and Ana Kubelka, IMP Project Assistant, participated on the 37th World Energy Engineering Congress (WEEC) that was held in Washington, DC from October 1-3, 2014. Organized by the Association of Energy Engineers (AEE), the WEEC is well-recognized as the most important energy event of U.S. and international scope for end users and energy professionals in all areas of the energy field. This annual event featured a large, multi-track conference agenda, a full line-up of seminars on a variety of current topics, and a comprehensive exposition of the market's most promising new technologies. The conference and expo explored a complete spectrum of technologies and services of great importance including, but not limited to: energy efficiency and energy management; renewable, green and alternative energy; smart grids and electric metering innovations; integrated building automation and energy management solutions; energy services, energy procurement and project financing; solar and fuel cell technologies; etc.



Picture 8: 2014 WEEC Expo

Project presentation in USAID E&E Bureau in Washington, DC

IMP representatives networked with groups and individuals at the event and distributed a brochure presenting IMP as a proven way to boost companies' competitiveness and bring forward a culture of continuous improvement. The brochure was well received and raised interest among attendees.

IMP representatives presented the project and discussed progress at the USAID E&E Bureau in Washington, DC. The discussion was closely followed by representatives from the National Renewable Energy Laboratory (NREL) and the Department of Energy (DoE).

Round Table



Picture 9: Round Table Discussion – December 16, 2014

On December 16, 2014, the USAID Industrial Management Project (IMP) in cooperation with the project's stakeholder Macedonian Energy Association (MEA) within the Economic Chamber of Macedonia hosted a round table discussion about how Macedonian companies can improve their competitiveness and foster a culture of continuous improvement through enhanced energy management practices. Mr. James Stein, the USAID Macedonia Mission Director, Mr. Steven Burns, USAID E&E Bureau Chief of Energy from Washington DC office, and representatives from the private sector made remarks. About 50 participants from various stakeholders including government officials, relevant ministries, Energy Agency, Energy Regulatory Commission, non-government organizations, international donor community, financial institutions, industrial associations and business community attended the event.



Picture 10: Representative of EMS beneficiary company shares its experience on the event

On the event representatives from the project pilot companies Alkaloid, Knauf Radika, and Hi-Tech Corporation also presented their experiences and achieved results. Alkaloid discussed the accomplishments of using their energy management system, specifically focusing on the already completed energy efficiency refurbishment of their laboratory building, which was financed through the EBRD's Western Balkan Energy Efficiency Financing Facility (WeBSEFF II) loan approved by NLB Tutunska Bank, which was supported by IMP's technical assistance and access-to-finance services. Knauf Radika presented noted anomalies in their production plant detected by use of the energy management system and plans how to correct them and further improve their operations. Hi-Tech Corporation discussed about the significance of running such system and its impact when competing on international markets.

"Once we installed the energy management system we were able to see the real picture and thus, to take further steps. Now we use less energy, and we also installed new equipment. Our first-year accomplishment is about 10% reduction in our energy consumption. This is a very positive initiative."

**MR. SAVO STANKOVIK, GENERAL MANAGER
HI-TECH CORPORATION**

The objective of the round-table was to discuss benefits of introducing energy management in industrial companies and to look into possibilities of scaling-up energy management best practices in Macedonia.

IMP will continue to market the project by presenting results and case studies. Thus, it plans to continue organizing round tables in 2015 as one of the vehicles to showcase benefits to companies from improving their competitiveness and helping the national economy overall.

IMP Publications

Recognizing the need of development of materials that will further promote the need for introduction of a systematic and continuous energy management approach in local industrial private companies in order to increase their energy efficiency, the IMP designed and printed a brochure “Have You Consider Other Ways To Boost Your Competitiveness?”. The brochure consists of three main sections - Process and System Operations Improvement, Energy Management Systems, and Investment Opportunities. The text also documents project activities, achievements, expected results and their impact on the country’s private sector development as well as on the environment.

The brochure was used to promote the Industrial Management Project and the concept of continuous energy management improvement within the USAID HQ in Washington DC, at the World Energy Engineering Congress held in Washington DC on October 1-3, 2014 as well as at various project promotional events.

By promoting the benefits to pilot companies, the IMP team expects to increase interest for involvement of other candidate companies in the project.

Media outreach

The Industrial Management Project regularly uses Macedonian national and local media as a tool to deliver messages to the public, and gain greater public awareness of the project’s activities, concepts, achievements and results. Over the course of 2014, IMP activities and achievements were featured in national television, radio and newspapers. Public events, conferences, and presentations organized this year (outlined in the previous section) received extensive media coverage in major national media, including Kapital daily, Dnevnik daily, Utrinski Vesnik daily, Vecer daily, Economy and Biznis, Kurir, Business Info, Denar, Vesti24, Kanal 5, Sitel TV, Macedonian National Television (MTV), macedonian Radio, Telma TV, Alfa TV, AlSat M, Sky Net and many others. Several press releases were released to media to announce major IMP events.

The Industrial Management Project continuously monitors media for articles and reports on its activities, results and achievements as well as those focusing on IMP supported companies. These press clippings are compiled and regularly submitted to USAID Mission office.

Interview in BI.mk

In January 2014, the Project Chief of Party Dragan Blazelev had an interview on the BI.mk website where he comprehensively explained the project components and its expected results giving, at the same time, a brief overview on the situation in the energy sector in the country and the reasons for

initialization and USAID support of this project. The CoP also emphasized the benefits for the local private industrial companies involved in the project. The link to the interview in Macedonian is given below.

<http://bi.mk/%d1%81%d0%be-%d0%bd%d0%b0%d0%bc%d0%b0%d0%bb%d1%83%d0%b2%d0%b0%d1%9a%d0%b5-%d0%bd%d0%b0-%d0%bf%d0%be%d1%82%d1%80%d0%be%d1%88%d1%83%d0%b2%d0%b0%d1%87%d0%ba%d0%b0%d1%82%d0%b0-%d0%bd%d0%b0-%d0%b5%d0%bd/>

Press Conference

The Industrial Management Project publicly presented the results achieved during the first year of its implementation on a press conference held in the Macedonian Chamber of Commerce premises on April 07, 2014. More than 13 media attended the conference where they had a chance to hear not only about the so far made project accomplishments but also about the advantages that each company would have by increasing its energy efficiency through introduction of a systematic and continuous energy management approach. The importance of the introduction of the energy management approach in the industrial companies was also stressed by Mr. Danco Vidov, Corporative Development and Export Director in the company for dairy products Zdravje Radovo. As representative of one of the industrial pilot companies that have fully installed Energy Management Systems in their production facilities with the US Government assistance and the IMP, Mr. Vidov emphasized the importance of planning and management of energy efficiency measures that lead to reduced energy costs, decreased product costs and ultimately, to improve company's competitiveness on the local, regional and international markets.



Picture 11: Project Press Conference at the Economic Chamber of Macedonia – April 07, 2014

Project promotional materials were disseminated to more than 20 media present on the event.



Picture 12: Project Press Conference at the Economic Chamber of Macedonia – April 07, 2014

Interview in Economy and Business monthly magazine

IMP continued its cooperation with the monthly “Economy and Business”. In the April 2014 magazine’s issue the COP Dragan Blazeв gave an overview how the introduction of an Energy Management System in an industrial company helps the company to become economically more advanced. He also emphasized the activities and project results so far achieved under the USAID IMP and explained the project development process.

BUSINESS PROJECTS

ENERGY MANAGEMENT SYSTEMS CREATE ECONOMICALLY ADVANCED INDUSTRIAL COMPANIES



Dragan Blazeв,
Chief of Party, USAID
Industrial Management
Project

Energy efficiency in industry contributes to the economic growth and has positive impact on the environment. In the same time, the implementation of energy efficiency measures leads to reduction of energy consumption, energy intensity and improvement of the industrial companies' competitiveness. Industry is responsible for more than one third of global primary energy consumption and energy-related carbon dioxide emissions. Industrial energy use is estimated to grow at an annual rate of between 1.8% and 3.1% over the next 25 years. In many countries this tendency often creates disturbance between economic development goals and constrained energy supply. According to the International Energy Agency, industry has the technical potential to decrease its energy intensity, and hence GHG emissions, by up to 26 per cent on global level. Improving energy efficiency in industry is one of the most useful and cost-effective measures to help emerging countries reduce energy import dependence, increase economic growth and diminish environmental degradation. As a country whose economic development is based on development of energy sector and on reduction of the dependence from electricity and other energy resources import for domestic needs, the promotion and investments in energy efficiency is crucial for the Republic of Macedonia.

Beginning of 2013, as part of its Medium-term growth strategy for the Republic of Macedonia and based on the findings of previously conducted analyses that significant results can be achieved by further energy management and more efficient energy use by industrial companies, the USAID Macedonia has commenced with implementation of three-year Industrial Management Project. TimePricer, a local private consulting and engineering company, has been contracted by USAID to implement the project. This is a first case in the region where a local private company has been directly awarded a USAID project, given that all previous USAID direct contracts are signed with non-governmental organizations from the region. Pricer Consulting and the Center for Entrepreneurship and Executive Development – CEED Macedonia are implementing partners in the project.

The overall objective of the Industrial Management Project is to improve the competitiveness of industrial companies by reducing energy consumption and energy costs as part of the total production costs that will further lead to reduction of greenhouse gases (GHG) emissions on a long-term basis. More specifically, the project aims at improving energy

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Interview in InStore (May issue)

In April 2014, the monthly InStore approached the project asking for an expert opinion on the benefits that the recent electricity market liberalization in the country brings to the Macedonian companies and the economy in general. In its May issue, this regional monthly magazine that covers the entire industry in the country, regionally

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МИСЛЕЊА И КОМЕНТАРИ

АНАЛИТИЧКИ СТАВ



Драган
Блажев,
директор за
индустријски
менаџмент на
проектот УСАИД

На македонските компании што сојуваат комерцијална енергија биле рестриктирани со рестриктирана снабдувачка на енергија, а енергијата биле рестриктирана на пазарот, иринувањето на енергија од 1 април 2014 година ни донесе новиска цена за потрошена енергија, но споредбата со рестриктираната цена што ги навлеа претходно. Пазарната цена се одредува во согласност со претходните на отворениот пазар на енергија, а не споредбата со рестриктираната цена што ги навлеа претходно. Пазарната цена се одредува во согласност со претходните на отворениот пазар на енергија, а не споредбата со рестриктираната цена што ги навлеа претходно.

реано време. Од тој момент, сегашната состојба на пазарот што значи на либерализацијата на пазарот, иринувањето на енергија од 1 април 2014 година ни донесе новиска цена за потрошена енергија, но споредбата со рестриктираната цена што ги навлеа претходно. Пазарната цена се одредува во согласност со претходните на отворениот пазар на енергија, а не споредбата со рестриктираната цена што ги навлеа претходно.

Како најголема икономска на либерализацијата на пазарот, иринувањето на енергија од 1 април 2014 година ни донесе новиска цена за потрошена енергија, но споредбата со рестриктираната цена што ги навлеа претходно. Пазарната цена се одредува во согласност со претходните на отворениот пазар на енергија, а не споредбата со рестриктираната цена што ги навлеа претходно.

and worldwide, published the IMP Chief of Party view on the benefits and challenges that the Macedonian companies as qualified electricity market users face with the liberalization of the electricity market.

IMP Project promotion on USAID country website & FB page

During the reporting period, the USAID Macedonia website regularly posted news about the Industrial Management Project events, activities and presentations. The project also used the Facebook page of the USAID mission in Macedonia to timely inform the public of its activities. The link to the USAID Macedonia Facebook page is as follows:

<https://www.facebook.com/USAIDMacedonia>

6 PROJECT MANAGEMENT

IMP was conducting activities as per the approved first-year Work Plan. After preparing an in-depth analysis of industrial sector and prioritizing industrial subsectors, the biggest focus was put on discussion with management boards of industrial companies followed by on-site screening and conducting walk-through audits at selected candidate companies that showed clear interest for EMS implementation. Considering that candidate companies lacked project documentation and often did not have relevant technical staff under payroll, the team enhanced by engineers and industrial experts put extra effort to screen and prepare EMS project plans and detailed cost specifications. The overall activities were closely monitored and coordinated from the main project office.

The team focus was to deliver best results within time and with quality. Therefore, all planning, organizing and controlling were done to meet the specific objectives as included in contracted milestones.

The primary challenge of project management was to achieve all of the project goals and objectives while honoring all conditions and constraints.

7 PERFORMANCE MONITORING AND EVALUATION

The Industrial Management Project carries out continuous monitoring in order to ensure systematic assessment of the performance and progress of IMP interventions toward achievement of results. The IMP monitoring efforts track the technical assistance and resulting outcomes from IMP activities aimed to increase competitiveness of industrial companies through reduced production (energy) costs and to reduce GHG emission on a long-term basis. The Information obtained from the monitoring activities provides the project's management with an indication of the degree of project progress and is used as a basis for decision making and taking action in order to timely achieve the anticipated project results.

The monitoring process incorporates different methods to measure the outputs, outcomes and impact of IMP activities, such as structured questionnaires, surveys, regular visits and maintenance of good relationship with client companies, updated company profiles, etc. Once the necessary data is collected and analyzed, the project will produce different types of reports and statistics for presentation of the results.

7.1 IMP progress against Performance Monitoring Plan (PMP) Targets

In order to perform more efficient and effective monitoring, IMP developed a Performance Monitoring Plan that provides summarized information on the project components and deliverables, indicators for achievement, their definition, unit measure, disaggregation, data source and collection methods, timing and frequency of data collection, methods of analysis, and targets to be achieved.

The project activities outlined in this report are organized around the following measurable project performance indicators:

1. **Percentage of reduced GHG emissions as a result of USG assistance** - The reduction in GHG emissions by pilot companies before and after the USG assistance will be measured and recorded on annual basis. This indicator will be measured in percentage after the implementation of energy efficiency measures, as a comparison between the actual and baseline GHG emissions. The results will be available in 2015 after one-year of monitoring period for all companies that installed systems in 2014.
2. **Number of visited companies that expressed interest for EMS implementation** – The project visited a number of companies that expressed interest to participate on the project and thus, submitted filled in questionnaire. Additional 15 companies received cost specifications & project plans for EMS implementation in 2014.
3. **Number of companies that successfully install EMS as a result of USG assistance and cost-sharing** – This indicator defines the number of companies that signed contract for EMS installation as a result of USG technical assistance and cost-sharing. In 2014, five companies have signed contracts with IMP for EMS supply and installation.
4. **Percentage of electricity savings in pilot companies** – The electricity savings in assisted companies, measured as percentage of electricity savings before and after measures, will be reported on annual basis after pilots' implementation. This indicator will be calculated as percentage i.e. ratio of electricity savings after implementation and baseline condition. The results will be available in 2015 after one-year of monitoring period for all companies that installed systems in 2014.
5. **Value of investments for installation of EMS as a result of USG assistance** – The investments made for development and installation of EMS in selected companies as a result of USG technical assistance and cost-sharing is also measured annually. In 2014, the total contracted value amounts to over \$177,000.
6. **Number of non-participant companies that received training on Energy Management, ISO 50001 and EE best practices** – IMP will provide training to non-participant companies on industrial energy management and ISO 50001 including best practices learned from demonstration projects. Non-participant companies are industrial companies from different industrial branches that meet criteria from IMP industrial analysis prepared during the project inception phase. In 2014, 60 participants from 39 industrial companies participated in training for industrial energy management and ISO 50001 concepts.
7. **Number of person-days of training on Energy Management services for local engineering companies (LEC)** - During the project implementation two local engineering companies received 30 person-days (each) of training and practical experience on energy management project preparation, energy management system installation and maintenance and energy use data collection. A person-day is defined as 6 hours a day. The training will include theoretical and practical part. This indicator will be measured the second year of project implementation.

Table 5 below provides an overview of IMP targets and performance to date. The project will continue to track indicators and to provide and record the updates.

Table2: PMP Summary Table – Targets and Results in 2014

#	Performance Indicator	Description	2013		2014		2015		TOTAL	
			Targeted	Actual	Targeted	Actual*	Targeted	Actual	Targeted	Actual
1	Percentage of reduced GHG emissions as a result of USG assistance	Percentage of reduced in GHG emissions by pilot companies before and after USG assistance, as a comparison between actual and baseline GHG emissions.	0%	0%	3%	TBD	7%		7%	
2	Number of companies that expressed interest for EMS implementation	Number of companies that expressed interest and received cost specifications & project plans for EMS implementation as result of project intervention.	15	17	10	15	0		25	
3	Number of companies that successfully install EMS as a result of USG assistance and cost-sharing	Number of companies that signed contract for EMS installation as a result of USG assistance and cost-sharing.	10	7	7	5	0		17	
4	Percentage of electricity savings in pilot companies	Electricity savings in assisted companies measured as percentage of energy savings before and after measures. Weighted average of operational pilot projects.	0%	0%	3%	TBD	7%		7%	
5	Value of investments for installation of EMS as a result of USG assistance	Investments made for installation of EMS in selected companies as a result of USG technical assistance and cost-sharing.	\$350,000	\$276,000	\$250,000	\$177,000	0.00		\$600,000	
6	Number of non-participant companies that received training on Energy Management, ISO 50001 and EE best practices	Number of industrial non-participant companies that received training on industrial energy management and ISO 50001 including best practices learned from demonstration projects.	5	20	20	39	20		45	
7	Number of person days of training on Energy Management services for local engineering companies (LEC)	Number of person days of training and practical experience on energy management project preparation, energy management system installation and maintenance and energy use data collection that local engineering companies received.	0	0	60	60	0		60	